"Why is everyone always angry with me?!": When thinking 'why' leads to generalization

Jens Van Lier, Bram Vervliet, Yannick Boddez & Filip Raes

KU Leuven

Corresponding author

Jens Van Lier email: jens.vanlier@ppw.kuleuven.be

Tiensestraat 102

3000 Leuven

ABSTRACT

Background and Objectives: The degree of (over)generalization (to the self, over situations) is an important characteristic of depression and anxiety disorders. Little is known about cognitive mechanisms underlying this (over)generalization. In this context, the present study examined the effect of an abstract processing style (compared to a more concrete processing style) on generalization of angry faces to the self. An abstract processing style refers to thoughts about the meaning, causes and consequences of events or situations ('Why'-thinking). **Methods:** To test the impact of an abstract processing experimentally, images of angry faces were paired with the name of the participant and happy faces were paired with another person's name while participants adopted either an abstract ('Why') or a concrete ('How') processing style. A surprise recognition task, where participants were asked to indicate whether they had seen the faces before, served as a test of generalization of angry faces to the self. **Results**: Results indicated that participants who adopted an abstract processing style showed more generalization of angry faces to the self and a trend towards more generalization of happy faces to the other person, relative to participants who adopted a concrete processing style. **Limitations:** Our sample was a non-clinical student sample and thus conclusions about the generalizability to clinical samples should be done with caution. **Conclusions**: These results suggest that abstract thought may underlie the generalization of bad/failure/angry feelings toward the self ('Everyone is always angry with me') and of good feelings towards other people ('Everyone is always nicer to other people') that is often seen in depression and social anxiety disorder.

Keywords: Rumination; Abstract and concrete processing; Generalization; Social Anxiety; Depression

INTRODUCTION

Some forms of repetitive thought are unconstructive while others are constructive (Watkins, 2008). Two of the probably most studied unconstructive repetitive thinking styles are rumination and worry. These thinking styles have been known to impact the onset and duration of depression and anxiety disorders (e.g., Nolen-Hoeksema, 2000; McLaughlin & Nolen-Hoeksema, 2011; Segerstrom, Tsao, Alden, & Craske, 2000; for reviews: Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008; Watkins, 2008). One aspect of repetitive thought that has been consistently found to be unconstructive is the 'why'-mode (i.e., an abstract processing style) rather than the 'how'-mode of thinking (i.e., a concrete processing style; Watkins, 2008).

The literature on these processing or thinking styles (for review, see Watkins, 2008) often uses the representations of abstract, higher level construals and concrete, lower level construals (e.g., Trope & Liberman, 2003). As such, Watkins (2008, p. 187) postulates that abstract construals (i.e., an abstract processing style) are general, superordinate, and decontextualized mental representations that convey the essential gist and meaning of events and actions, such as representations of "why" an action is performed and of its ends and consequences. In contrast, concrete construals (i.e., a concrete processing style) are more low-level mental representations that include subordinate, contextual, and incidental details of events and actions, such as representations of the specific "how" details of an action and of the means to an end.

It is the abstract processing style, particularly when focused on negative content, which is so typical of maladaptive rumination and worry. This abstract processing style is associated with depression and anxiety disorders (Watkins, 2008). Accordingly, experimental manipulations of abstract (vs. concrete) processing styles have produced negative outcomes for clinically important phenomena, such as

problem solving (Watkins & Moulds, 2005), emotional recovery after failure (Watkins, 2004), overgeneral autobiographical memory (Raes, Watkins, Williams, & Hermans, 2008), and global self-judgments (Rimes & Watkins, 2005). In the context of social anxiety, Wong and Moulds (2009) found that abstract rumination (relative to distraction) maintained anxiety after a social-evaluative task. Mirroring these findings, Vassilopoulos and Watkins (2009) found that concrete thinking decreased ratings of the self as worthless and incompetent. The unconstructive consequences of the abstract mode (vs. concrete) have thus experimentally been demonstrated with various outcomes and in different contexts (but also see Wong & Moulds, 2012).

Watkins (2008; also see Van Lier, Vervliet, Vanbrabant, Lenaert, & Raes, in press) notes that one candidate mechanism for the negative consequence of an abstract processing style is the degree of generalization following negative emotional events. In essence, generalization helps people to transfer knowledge over situations (Hermans, Baeyens, & Vervliet, 2013). However, excessive generalization may be the basis for psychopathology like anxiety or depression (Hermans et al., 2013). A classic example would be a person who, following a disagreement with a colleague believes that *everyone* (strangers, friends, family, etc.) is *always* mad at him and that he cannot do *anything* right. In the depression literature, Beck (1976) identified overgeneralization as "unjustified generalization on the basis of a single incident" (p. 94). Also in the context of anxiety disorders, generalization has been identified as a crucial phenomenon underlying the expansion of complaints (e.g. Lissek, Biggs, Rabin, Cornwell, Alvarez, Pine, & Grillon, 2008; Vervliet, Kindt, Vansteenwegen, & Hermans, 2010; Lenaert, Boddez, Griffith, Vervliet, Schruers, & Hermans, 2014; Dymond, Dunsmoor, Vervliet, Roche, & Hermans, in press).

An abstract processing style is characterized by thoughts about causes, meanings

and consequences of a certain event or situation (Watkins, 2008; for the disagreement example above this would be thoughts like: “Why does this happen to me?”; “What does this say about me as a person?”; “What does this mean for the future?”). In comparison, a concrete processing style is much more focused on the specific (perceptual) details of an event (Watkins, 2008; for the disagreement example above this would be thoughts like: “What happened exactly?”; “How can I fix this?”; “What exactly did I hear?”). Therefore, we theorize that an abstract processing style may have its impact on generalization by producing a mental representation with fewer contextual details about negative situations (i.e., ‘perceptual blurring’). Related to this, Suengas and Johnson (1988) showed that thinking back repeatedly about the apperceptive aspects of an event (e.g., how they felt during the event) reduced the contextual and perceptual characteristics of the later memory for the event, as compared to a more perceptual processing style (focusing on colors, sounds, etc.). When fewer contextual details are remembered about the negative situation, similar negative situations can come to elicit the same response because these will be misidentified as the initial negative event (Riccio, Ackil, & Burch-Vernon, 1992). This study aims to experimentally test the effect of an abstract (vs. concrete) processing style on generalization.

In the present study, we presented participants with images of happy and angry faces while we manipulated the participants’ processing style. The angry faces were paired with their own name and the happy faces with another name. As such, participants learn that their own name is always paired with an angry face and the name of someone else[1] is paired with a happy face. To manipulate the processing style participants were asked either to think about the meaning and causes of the

[1] In this experiment the name was ‘Jan’ which is a very common name in Flanders, Belgium.

facial expressions they saw (i.e., abstract processing style) or to think about the sensory-perceptual features of the faces they saw (i.e., concrete processing style; for similar processing style inductions see, for example, Watkins & Moulds, 2005; Raes et al., 2008). To assess generalization, participants were presented with a surprise recognition test. In this test they had to specify whether the image of a person looking angry or happy had been paired with their own name, the other name or was a new image. We included new angry and happy faces and we changed the expression (e.g., from happy to angry) of some images that have been presented in the previous face. In this study, generalization implies that participants would seem to act according the rule "If I see an angry face, it will be paired with myself (my own name)" to the new angry face images or to the images where the expression had changed.

We hypothesized that participants in the abstract processing style (relative to a concrete processing style) would indicate that more new angry face images or images where the expression changed to angry were paired with their own name. This would indicate that an abstract processing style impacts generalization. It is often found that manipulations of processing style have effects only in vulnerable groups (Watkins & Teasdale, 2004; Watkins & Moulds, 2005, Wong & Moulds, 2012). Therefore, higher social anxiety symptoms are predicted to moderate (i.e., strengthen) the relationship between induced processing style and generalization. We focus on social anxiety symptoms because it has been shown that individuals with social phobia show a specific bias towards angry faces (e.g., Horley, Williams, Gonsalvez, & Gordon, 2004; Joormann & Gotlib, 2006).

METHOD

Participants

Participants were recruited from a secondary school in Flanders, Belgium. All participated without compensation. A total of 99 students (51 boys) participated in the study. Their mean age was 16.96 years (*SD* = 1.11; age range: 15–19; age info missing for 7 participants). Informed consent was obtained from all participants prior to participation.

Materials

Induction. In the abstract condition participants were instructed to think about the meaning and causes of the faces they saw (i.e., the person looking angry at yourself or looking happy at 'Jan'). The instructions therefore read: *"If you see how he/she looks at you… How does this person probably think about you? Why does this person think about you that way?*" or "*If you see how he/she looks at Jan… How does this person probably think about Jan? Why does this person think about Jan that way?*" In the concrete condition participants were instructed to think in a more sensory-perceptual (i.e., concrete) fashion about the person they saw on the photo. The instructions read: *"Focus your attention on the person that you just saw: the hair, the facial expression, the eyes, the lips, the shape of the face, the mouth, the nose…"*

Stimuli. The faces were taken from the Karolinska Directed Emotional Faces (KDEF; Lundqvist, Flykt, & Öhman, 1998) database. The KDEF is a set of 4900 pictures of human facial expressions of emotion. We first selected 20 (10 male and 10 female) angry and 10 (five male and five female) happy faces shown from a frontal angle. These 30 faces were used in the learning phase (see Figure 1 for an example). We used 20 angry faces and 10 happy faces to enhance the awareness of the own name-angry face pairing because this was our main focus of interest. Also, we wanted to ensure that participants were not thinking that there was a 50 percent chance for a happy or angry face.

In the test phase 12 (six male and six female) out of the 20 angry faces were retained and the remaining eight faces (four male and four female) were now shown with a happy expression (Figure 1). Out of the 10 happy faces in the learning phase four faces (two male and two female) remained the same and six faces (three male and three female) were now shown with an angry expression in the test phase (Figure 1). In the test phase 10 new faces were included, six new angry faces (three male and three female) and four new happy faces (two male and two female).

Source Memory Question. The question was worded as follows: "*Do you recognize this person, and with whom have you seen this person (irrespective of his/her facial expression)? – You, 'Jan' or you haven't seen this person before –"* Participants had to move a red dot (using the left and right arrows) across the three choices (*Me, Jan, New*) to select their desired response. They confirmed their answer by hitting 'Enter'. There was no time limit for this response.

Perseverative Thinking Questionnaire (PTQ). The PTQ **(**Ehring, Zetsche, Weidacker, Wahl, Schönfeld, & Ehlers, 2011**)** is a 15-item questionnaire measuring repetitive negative thought that is independent of a specific content. The items assess the repetitiveness (e.g., 'The same thoughts keep going through my mind again and again'), intrusiveness (e.g., 'Thoughts just pop into my mind'), difficulties to disengage (e.g., 'I can't stop dwelling on them') and unproductiveness of recurrent negative thinking (e.g., 'I keep asking myself questions without finding an answer') as well as the degree to which rumination captures mental capacity (e.g., 'My thoughts prevent me from focusing on other things'). Participants are asked to rate the items on a 5-point scale, from 0 (*never*) to 4 (*almost always*). The PTQ has shown good psychometric properties (Ehring et al., 2011). In this study the Dutch version was used (Ehring, Raes, Weidacker & Emmelkamp, 2012; Cronbach's $\alpha = .93$). The

internal consistency for the PTQ in this sample was good (α = .88). A recent study further shows that the PTQ has prospective predictive validity for depressed mood (Raes, 2012).

Depression Anxiety Stress scale (DASS 21). The DASS 21 is a 21-item self-report questionnaire that measures negative emotional states of depression, anxiety and stress (Lovibond & Lovibond, 1995). The depression subscale has good internal consistency (α = .81, Lovibond & Lovibond, 1995). The 7-item depression subscale of the Dutch version (de Beurs, Van Dyck, Marquenie, Lange, & Blonk, 2001) was used in this study. The internal consistency for the depression subscale in this sample was good (α = .82). Each item is scored on 4-point scale ranging from 0 (*Did not apply to me at all*) to 3 (*Applied to me very much, or most of the time*).

Fear of Negative Evaluation Scale (BFNE). The Dutch version of the 12-item brief Fear of Negative Evaluation scale (Bögels, unpublished; Leary, 1983) was used as a measure of social phobia. The BFNE has good internal consistency (α = .90, Leary, 1983). The internal consistency for the BFNE in this sample was very good (α = .96). The items are rated on a 5-point scale ranging from 0 (*Not at all characteristic of me*) to 4 (*Extremely characteristic of me*).

Mood and self-focus. The participants were requested to indicate to what extent they felt despondent on a visual analogue scale ranging from 0 (*not at all despondent*) to 100 (*very despondent*) and to what extent their attention was focused at themselves 0 (*not at all self-focused*) to 100 (*very self-focused*). These measures were included to examine whether the inductions of abstract or concrete processing style would have an equivalent effect on mood and self-focus.

Manipulation check. For the abstractness rating the participants were requested to indicate to what extent they had been thinking about how that person was thinking

about them and why that person was thinking about them in that way on a visual analogue scale ranging from 0 (*not at all*) to 100 (*very much*). For the concreteness rating the participants were requested to indicate to what extent they had been focusing their attention on the person they had seen: their hair, their facial expression, their nose, mouth, eyes etc. on a visual analogue scale ranging from 0 (*not at all*) to 100 (*very much*).

Procedure

The study was conducted in a group setting in a computer room of the participating school. The respective class groups were randomly allocated to either the concrete or abstract processing mode condition. Participants gave written informed consent and received an individual booklet with all materials, organized in the same order. On the first page participants had to rate their mood and self-focus. Then, they were instructed to follow the instruction on the screen of the computer. Affect 4.0 software (Spruyt, Clarysse, Vansteenwegen, Baeyens, & Hermans, 2010) controlled the stimulus sequence, the presentation of the stimuli and the inter-trial intervals.

Participants started with a training phase where they were presented with a name-face sequence four times (two times their own name – angry face, two times 'Jan' – happy face). The name was shown for one second and the face stimulus for two seconds. They were instructed to write down their answers for the abstract or concrete induction for 40 seconds on the second page of the booklet. This phase was primarily used to familiarize the participants with the procedure. After this phase they were instructed about the actual learning phase. In this phase they did not have to write, but think (in either an abstract or concrete mode) by themselves about the faces they had seen for 10 seconds while the induction remained on screen (see Figure 1). The

stimuli were presented in a random order. After the learning phase they were instructed to rate their mood and self-focus again in the booklet.

In the subsequent test phase they were asked to indicate whether they had recognized the person as being paired with their own name or 'Jan'. The stimuli in this phase were presented in a random order. After this phase, participants answered the manipulation check questions in the booklet and the remaining questionnaires (PTQ, DASS and BFNE).

RESULTS

Participant Characteristics

Table 1 displays the correlations, means and standard deviations of the study measures. As expected, perseverative thinking (PTQ) was positively associated with depressive symptoms (DASS-depression) and fear of negative evaluation (BFNE) scores. However, DASS-depression was not associated with BFNE in this sample, r = .17, p = .10. The participants in the concrete condition scored higher on DASS-depression than in the abstract condition, $t(97) = 3.36$, $p < .01$. In the crucial analyses we will therefore control for DASS-depression score.

Mood and Self-Focus

To check whether the inductions of abstract and concrete processing modes did not have a differential effect on mood or self-focus, a 2 (Condition: abstract vs. concrete) × 2 (Time: baseline vs. post-learning) repeated measures ANOVA was conducted with mood and self-focus as dependent variables. For mood, there was a main effect of Time, $F(1,97) = 8.97$, $p < .01$, $\eta_p^2 = .09$ and also a significant Condition × Time interaction, $F(1,97) = 4.16$, $p < .05$, $\eta_p^2 = .04$. Paired samples t-tests revealed that participants in the abstract condition did not change in mood, $t < 1$, whereas

participants in the concrete condition decreased in mood from baseline to post-learning phase, $t(49) = -4.06$, $p < .001$. However, when we compare mood at baseline and post-learning phase there are no differences between the abstract and concrete condition, $t < 1$, and $t = -1.19$, respectively.

There were no significant effects for self-focus, demonstrating that both conditions did not differently influence self-focus. Further results could thus not be explained by an increased self-focus for participants in the abstract condition.

Manipulation Checks

For the concrete VAS, participants in the concrete condition scored higher than the abstract condition, $t(97) = -2.79$, $p < .01$. For the abstract VAS, participants in the abstract condition scored higher than the concrete condition, $t(97) = -2.27$, $p < .05$. This confirms the intended effects of the processing style inductions.

Recognition Task

Previous work on rumination or processing style found stronger negative effects for high socially anxious people (high in fear of negative evaluation; e.g., Vassilopoulos & Watkins, 2009; Wong & Moulds, 2009, 2012). Therefore, higher social anxiety symptoms are predicted to moderate the effect of induced processing style on recognition for the crucial generalization stimuli (i.e., the faces where the expression in the test phase had changed from happy to angry and the new angry faces). We did not have clear hypotheses about performance on the original face images and the faces that changed from angry to happy and the new happy faces.

We conducted a regression analysis with Condition (abstract vs. concrete) and BFNE scores (centered around the mean) as independent variables and each proportion (proportion ‘Me’, ‘Jan’ and ‘New’ answers for the groups of images) as

the dependent variables[2]. We focus first on the original stimuli and afterwards we focus on the crucial generalization stimuli, the faces that changed from angry to happy and the new happy faces. Table 2 displays the mean proportions of the 'Me' 'Jan', or 'New' answers for every group of stimuli.

Performance on original stimuli

For these stimuli we did not have specific hypotheses. If anything, we would expect that the conditions would not differ in their proportion of correct answers for the original stimuli. This would confirm that the increased proportion for the false 'Me' answers for the generalization stimuli is not due to an overall poorer performance by the abstract condition.

12 Original Angry. There were no significant effects for proportion correct 'Me' answers, supposing that both conditions did not differ in their performance for these original angry faces[3].

4 Original happy. There were no significant effects for proportion correct 'Jan', again supposing that both conditions did not differ in their performance for these original happy faces[4].

Performance on crucial angry generalization stimuli

For these stimuli the crucial false 'Me' answer would indicate a generalization of the rule "If I see an angry face, it will be paired with myself (my own name)". Thus, we expected that the abstract condition would show an increased false 'Me' rate. We

[2] For each dependent variable we also controlled for DASS-depression score. However, in general there was no effect on the significance pattern of results when we controlled for depression.
[3] For proportion false 'Jan' answers there was an effect of BFNE scores, $t(97) = -2.15$, $p < .05$, $\beta = -.32$, and an interaction effect, $t(97) = 2.49$, $p < .05$, $\beta = .37$. For proportion false 'New' answers, there was an effect of Condition, $t(97) = 2.14$, $p < .05$, $\beta = .22$, with participants in the concrete condition rating more faces as new.
[4] For the proportion false 'Me' answers there was a significant interaction effect, $t(97) = 2.75$, $p < .01$, $\beta = .40$. For the false 'New' answers, there were no significant effects.

did not have specific hypotheses about the difference between conditions for the proportion of 'Jan' and 'New' answers.

6 Faces that changed from happy in first phase to angry in recognition task. For the crucial proportion false 'Me', we found an effect of Condition, $t(97) = -2.64$, $p < .05$, $\beta = -.26$, and a marginally significant effect of BFNE scores, $t(97) = 1.92$, $p < .06$, $\beta = .28$, but unexpectedly there was no significant interaction, $t < 1$. When we included performance on the original stimuli (i.e., basic accuracy: proportion correct 'Me' answers on the 12 original angry faces) the effect of Condition remained marginally significant, $t(97) = -1.93$, $p = .06$, $\beta = -.17$. In addition, there was an effect of this basic accuracy, $t(97) = 5.91$, $p < .001$, $\beta = .51$. No other effects reached significance.

The direction of the difference between abstract and concrete condition was as expected. Compared to the concrete condition, participants in the abstract condition rated more faces paired with 'Me', $t(97) = 2.57$, $p < .05$, *Cohen's d* = .52, and thus as hypothesized, show more generalization (Figure 2)[5].

6 New angry. For the crucial proportion false 'Me' answers there was an effect of Condition, $t(97) = -3.52$, $p < .01$, $\beta = -.34$, but no effect of BFNE scores and no interaction, both t's < 1. When we included performance on the original stimuli (i.e., basic accuracy: proportion correct 'Me' answers on the 12 original angry faces) there was a main effect of Condition, $t(97) = -3.12$, $p < .01$, $\beta = -.30$, and a main effect of this basic accuracy, $t(97) = 2.21$, $p < .05$, $\beta = .22$. There were no other effects that reached significance. As expected, the false 'Me' answer rate, indicating

[5] For the false 'New' answers, there was a significant effect of Condition, $t(97) = 2.97$, $p < .01$, $\beta = .29$, but no effect of BFNE-scores and no interaction, both t's < 1. Compared to the abstract condition, participants in the concrete condition rated more faces as new, $t(97) = -2.98$, $p < .01$, *Cohen's d* = .61. For the proportion correct 'Jan' there was only a marginally significant effect of BFNE scores, $t(97) = -1.97$, $p < .06$, $\beta = -.30$.

generalization, was higher in the abstract condition, $t(97) = 3.70$, $p < .001$, *Cohen's d* = .75 (Figure 2)[6].

Performance on happy generalization stimuli

For these stimuli the false 'Jan' answer might indicate a generalization of the rule "If I see a happy face, it will be paired with the other person ('Jan')". For these stimuli however, we had no specific hypothesis.

8 Changed angry-happy. There were no significant effects for proportion false 'Jan' answers[7].

4 New happy. For proportion false 'Jan' answers there were no significant effects, although there was a trend towards a main effect of Condition, $t(97) = -1.68$, $p = .10$, $\beta = -.17$. When we included performance on the original stimuli (i.e., proportion correct 'Jan' answers on the 4 original happy faces) the trend towards a main effect of Condition remained, $t(97) = -1.67$, $p = .10$, $\beta = -.17$. There were no other effects that reached significance. Therefore, for exploratory reasons and because of the frequently found effects of Condition in this study we also conducted a simple t-test on the proportion 'Jan' answers. The proportion false 'Jan' was marginally significant higher in the abstract condition, $t(97) = 1.92$, $p = .06$, *Cohen's d* = .39. Although exploratory and only with four faces, this might indicate a trend towards generalization of the "If I see a happy face, it will be paired with the other person ('Jan')" for the abstract condition[8].

DISCUSSION

[6] For the proportion false 'Jan' answers there was an effect of BFNE scores, $t(97) = -2.24$, $p < .05$, $\beta = -.33$ and a significant interaction, $t(97) = 2.31$, $p < .05$, $\beta = .34$. For the proportion correct 'New' there was an effect of Condition, $t(97) = 3.08$, $p < .01$, $\beta = .30$. The correct 'New' rate was higher in the concrete condition than the abstract condition, $t(97) = -3.23$, $p < .01$, *Cohen's d* = .66.

[7] For proportion correct 'Me' there was a marginally significant effect of BFNE scores, $t(97) = -1.87$, $p < .07$, $\beta = -.28$. There were no significant effects for proportion false 'New' answers.

[8] For the proportion correct 'New' there was an effect of Condition, $t(97) = 2.26$, $p < .05$, $\beta = .22$. The proportion 'New' rate was higher in the concrete condition, $t(97) = -2.48$, $p < .05$, *Cohen's d* = .50. There were no significant effects for proportion false 'Me'.

The present study was set up to examine the impact of an abstract versus a concrete processing style on generalization with facial affect stimuli in a memory paradigm. We hypothesized that participants in the abstract processing style condition (relative to participants in the concrete processing style condition) would associate more new angry and changed angry faces with their own name. This measure was used to assess generalization as a candidate mechanism of (one of) the negative consequence of an abstract processing style. We expected that the effect would be strengthened in people scoring high on social anxiety, because previous studies using manipulations of processing style have mainly found effects in vulnerable groups (e.g., dysphoric or depression: Watkins & Teasdale, 2004; Watkins & Moulds, 2005; high social anxious: Vassilopoulos & Watkins, 2009; Wong & Moulds, 2012)

As hypothesized, our results show that participants in the abstract condition generalize more angry faces to the self than participants in the concrete condition. Unexpectedly, this effect was not only found in participants with relatively high social anxiety symptoms, but also in participants with relatively low social anxiety symptoms. We also notice a trend towards more generalization in the abstract thought condition for the happy faces to the other person. These findings indicate that in a non-clinical student sample it might be detrimental to think in an abstract style about negative interpersonal contacts (i.e., 'think about why this person looks angry at you'). One reason might be that, when thinking abstractly, these people could rely more heavily on the simple rule "If I see an angry person, that person will *probably* be angry at me" or "If I see a happy person, that person will *probably* be not be smiling at me but at someone else". The reliance on this rule might in turn lead to the overgeneralization (e.g., "*Everyone* is always angry at me, I am a complete failure,") seen in depression (Beck, 1976; Carver & Ganellen, 1983; Klar et al., 1997) or social

anxiety (Fulford, Rosen, Johnson, & Carver, 2012).

Another explanation for our generalization results might be that the concrete processing style helps to remember the visual details of the face. These participants might better remember details about the eyes, the mouth, the hair etc. (e.g., a male person with black hair, brown eyes, round cheeks and thin lips when he looked angry). Then, when only the expression of that face changes (i.e., as for the crucial changed happy-angry generalization faces) they might still remember that it is the same male person with black hair, brown eyes and round cheeks. Thus, their memory is not affected for the source of that face (i.e., with their own name). Yet, the abstract processing style might reduce the visual detail of the faces that participants remember and hence a more holistic image of the face will remain in memory (e.g., a male person with black hair and an angry expression). Then, when the expression of the face changes they might only focus on the broader characteristic of the angry expression, leading to more false attributions of angry looking faces to their own name. Further research might thus explicitly focus on the effect of a concrete and abstract processing style on the amount of remembered visual details of the face.

Note that participants who were requested to rehearse visual aspects of the face (i.e., concrete condition) did not perform better than participants who had to rehearse in a more verbal way (i.e., abstract condition). Consequently, it was not the case that thinking in a concrete-perceptual way resulted in an increased performance on the source monitoring recognition task per se. However, the effect of the respective processing styles was only clearly demonstrated for the crucial generalization stimuli where the expression had changed from happy to angry and for the new angry faces. One may also wonder how the results of this study relate to findings on mood congruent processing (for a study on mood congruent processing see, for example,

Ridout, Noreen, & Johal, 2009). Importantly, our mood measure shows that there is no difference in mood between the abstract and concrete processing condition post-manipulation. Therefore, we can conclude that mood congruency effects are not underlying the present results. Moreover, from pre- to post-manipulation, we observed a decrease in mood only for individuals in the concrete processing condition. So, from a mood congruent processing perspective, one would predict increased generalization in the concrete condition and not in the abstract condition as we observed.

The detrimental effect of abstract thought for all participants, irrespective of their level of social anxiety symptoms, was surprising and deserves closer attention. The way we induced the respective processing styles was different to other research. For example, Wong and Moulds (2012) and Vassilopoulos and Watkins (2009) had participants go through a list of 30 self-focused items (e.g., "the physical sensations in your body"). In the analytical (i.e., abstract) mode they were instructed to think about the causes, meanings and consequences of the item. In the experiential (i.e., concrete) mode, participants were instructed to focus their attention on the experience of each item (Vassilopoulos & Watkins, 2009; Wong & Moulds, 2012). Note that Wong and Moulds (2012) actually found a negative effect of the experiential mode.

In the present study, however, after every name-face pairing participants were instructed to either think about the meaning and causes of the faces they saw (i.e., abstract processing) or to focus their attention on the sensory-perceptual features of that person (i.e., concrete processing). Because the memory for those faces during the induction served as our dependent variable, the manipulation of processing style was embedded in the task itself; whereas in the previous cited studies the manipulation was less related to the actual dependent variable. This might be one reason why our

results indicated negative effects for non-vulnerable individuals too. Hence, future studies could manipulate the way the induction is related to the dependent variable.

Another possible reason for the overall negative effects of an abstract processing style could be the specific dependent variable that was used. Our dependent variable, the amount of angry faces falsely associated with the self, might be a more implicit behavioral measure than measures used in previous studies that examined the influence of processing mode. For example, in Vassilopoulos and Watkins (2009) self-rating scales of global self-judgments and in Wong and Moulds (2012) self-rated anxiety and a self-beliefs questionnaire served as the dependent variable. Thus, in the aforementioned studies participants were asked to *explicitly* rate aspects about their self. Non-vulnerable people (low depressed or low anxious) might overcome a negative bias even when they were induced in abstract processing. This might be another reason why, in our study, the effect of processing style was not moderated by level of social anxiety symptoms. This could be an interesting issue for future research.

We note that the negative effects of the abstract processing style are relative to a concrete processing style. Hence, an alternative interpretation of the results is that individuals in the concrete processing mode produce a greater tendency to answer ‘new’, particularly when this is the correct answer. Therefore we cannot give a conclusive answer on which is the active ingredient in this study, i.e., abstract processing increasing generalization or concrete processing decreasing generalization. As such, the relatively positive effects of this concrete processing style may further enhance clinical interventions (e.g., in vivo exposure) directed at the remediation of social anxiety disorder. With regards to dysphoria and depression, recent studies that implemented concreteness training in therapy have found positive effects on

dysphoria (Watkins, Baeyens, & Read, 2009) and depression (Watkins, et al., 2012). Our study may further emphasize the clinical value of targeting abstract processing and training social phobic patients to adopt a more concrete processing style. Training social phobic patients to think in a more concrete manner (i.e., about visual aspects of the social situation or the person) instead of their default abstract way of thinking (i.e., focused on the meanings, consequences and implications of social situations; Watkins, 2008) might decrease the detrimental generalization that is often noticed in social phobia (e.g., "I am a complete failure in social situations"). As such, concreteness training is in accordance with and might complement Task Concentration Training (TCT) where individuals with social anxiety are trained to focus on the task or the person in the social situation (e.g., Bögels, Mulkens, & de Jong, 1997). However, studies that include people with diagnosed social phobia are clearly needed to further study the influence of processing style on generalization. Our sample was a non-clinical student sample and thus conclusions about the generalizability to clinical samples should be done with caution.

This study has several limitations. We did not have control over the thought process during the induction. Participants did not have to write down their thoughts. However, the manipulation check indicated that participants in the abstract induction were thinking more abstractly than participants in the concrete induction. Conversely, participants in the concrete induction were focusing their attention more on the perceptual-sensory features of the faces than in the abstract condition. Also, our participants were tested in their respective class groups and therefore everyone in the same class was in the same condition. Therefore, the failure to have properly randomized conditions might have led to baseline differences between the two conditions. However, only our depression measure showed a difference between

conditions. Moreover, when we controlled for this difference in depressive symptoms the results remained the same.

In sum, the present study is the first to use a processing style induction with facial affect stimuli in a memory paradigm to assess generalization. We found that an abstract processing style, compared to a concrete processing style, increases the false memory of angry faces being paired with the self and there is a trend towards an increase in the false memory of happy faces with someone else. In general, these results suggest that abstract thought can lead to (over)generalization of bad/failure/angry feelings toward the self (‘Everyone is always angry at me’) but also of good feelings towards other people (‘Everyone is always nicer to other people’) that is often seen in social phobia and depression.

Acknowledgements

This research was supported by the Center for Excellence on Generalization Research (GRIP*TT; KU Leuven grant PF/10/005). Jens Van Lier is a research assistant of the Research Foundation–Flanders (FWO)

REFERENCES

Beck, A. T. (1976). *Cognitive therapy and emotional disorders*. New York: Meridian.

Bögels, S. M., Mulkens, S., & de Jong, P. J. (1997). Task concentration training and fear of blushing. *Journal of Clinical Psychology and Psychoterapy, 4*, 251–258. doi: 10.1002/(SICI)1099-0879(199712)4:4<251::AID-CPP136>3.0.CO;2-5

Carver, C. S., & Ganellen, R. J. (1983). Depression and components of self-punitiveness: high standards, self-criticism, and overgeneralization. *Journal of Abnormal Psychology*, *92*, 330–7. doi:10.1037/0021-843X.92.3.330

de Beurs, E., van Dyck, R., Marquenie, L. A., Lange, A., & Blonk, R. (2001). De DAAS: Een vragenlijst voor het meten van depressie, angst and stress [The DAAS: a questionnaire for the measurement of depression, anxiety and stress]. *Gedragstherapie, 34,* 35-53.

Dymond, S., Dunsmoor, J. E., Vervliet, B., Roche, B., & Hermans, D. (in press). Fear generalization in humans: Systematic review and implications for anxiety disorder research. *Behavior Therapy.*

Ehring, T., Raes, F., Weidacker, K., & Emmelkamp, P. M. G. (2012). Validation of the perseverative thinking questionnaire – Dutch version (PTQ-NL). *European Journal of Psychological Assessment, 28,* 102–108. doi:10.1027/1015-5759/a000097

Ehring, T., & Watkins, E. R. (2008). Repetitive negative thinking as a transdiagnostic process. *International Journal of Cognitive Therapy, 1*, 192–205. doi:10.1680/ijct.2008.1.3.192

Ehring, T., Zetsche, U., Weidacker, K., Wahl, K., Schönfeld, S., & Ehlers, A. (2011). The Perseverative Thinking Questionnaire (PTQ): validation of a content-independent measure of repetitive negative thinking. *Journal of Behavior*

Therapy and Experimental Psychiatry, *42*(2), 225–32. doi:10.1016/j.jbtep.2010.12.003

Fulford, D., Rosen, R. K., Johnson, S. L., & Carver, C. S. (2012). Negative Generalization and Symptoms of Anxiety Disorders. *Depression*, *3*(1), 62–68. doi:10.5127/jep.019811

Hermans, D., Baeyens, F., & Vervliet, B. (2013). Generalization of acquired emotional responses. In M. D. Robinson, E. R. Watkins, & E. Harmon-Jones (Eds.), *Handbook of cognition and emotion* (pp. 117-134). New York: Guilford Press.

Horley, K., Williams, L. M., Gonsalvez, C., & Gordon, E. (2004). Face to face: visual scanpath evidence for abnormal processing of facial expressions in social phobia. *Psychiatry Research*, *127*, 43–53. doi:10.1016/j.psychres.2004.02.016

Joormann, J., & Gotlib, I. H. (2006). Is this happiness I see? Biases in the identification of emotional facial expressions in depression and social phobia. *Journal of Abnormal Psychology*, *115*, 705–14. doi:10.1037/0021-843X.115.4.705

Kinderman, P., Schwannauer, M., Pontin, E., & Tai, S. (2013). Psychological Processes Mediate the Impact of Familial Risk, Social Circumstances and Life Events on Mental Health. (J. Laks, Ed.)*PLoS ONE*, *8*(10), e76564. doi:10.1371/journal.pone.0076564

Klar, Y., Gabai, T., & Baron, Y. (1997). Depression and generalization about the future: Who overgeneralizes what? *Personality and Individual Differences*, *22*, 575–584. doi:10.1016/S0191- 8869(96)00186-9

Leary, M. R. (1983). A brief version of the Fear of Negative Evaluation scale. *Personality and Social Psychology Bulletin, 9*, 371–375. doi:10.1177/0146167283093007.

Lenaert, B., Boddez, Y., Griffith, J. W., Vervliet, B., Schruers, K., & Hermans, D. (2014). Aversive learning and generalization predict subclinical levels of anxiety: A six-month longitudinal study. *Journal of Anxiety Disorders*, *28*, 747–753. doi:10.1016/j.janxdis.2014.09.006

Lissek, S., Biggs, A. L., Rabin, S. J., Cornwell, B. R., Alvarez, R. P., Pine, D. S., & Grillon, C. (2008). Generalization of conditioned fear-potentiated startle in humans: experimental validation and clinical relevance. *Behaviour Research and Therapy*, *46*(5), 678–87. doi:10.1016/j.brat.2008.02.005

Lovibond, S. H., & Lovibond, P. F. (1995). *Manual for the Depression Anxiety Stress Scales (Second edition).* Sydney: Psychology Foundation.

Lundqvist, D., Flykt, A., & Öhman, A. (1998). The Karolinska Directed Emotional Faces - KDEF, CD ROM from Department of Clinical Neuroscience, Psychology section, Karolinska Institutet, ISBN 91-630-7164-9.

McLaughlin, K., & Nolen-Hoeksema, S. (2011). Rumination as a transdiagnostic factor in depression and anxiety. *Behaviour Research and Therapy*, *49*(3), 186–93. doi:10.1016/j.brat.2010.12.006

Nolen-Hoeksema, S. (2000). The role of rumination in depressive disorders and mixed anxiety/depressive symptoms. *Journal of Abnormal Psychology, 109*, 504–511. doi: 101037/10021-843X.109.3.504

Nolen-Hoeksema, S., Wisco, B. E., & Lyubomirsky, S. (2008). Rethinking Rumination. *Perspectives on Psychological Science*, *3*(5), 400–424. doi:10.1111/j.1745-6924.2008.00088.x

Raes, F. (2012). Repetitive Negative Thinking Predicts Depressed Mood at 3-Year Follow-up in Students. *Journal of Psychopathology and Behavioral Assessment, 34*(4), 497–501. doi:10.1007/s10862-012-9295-4

Raes, F., Watkins, E. R., Williams, J. M. G., & Hermans, D. (2008). Non-ruminative processing reduces overgeneral autobiographical memory retrieval in students. *Behaviour Research and Therapy, 46*(6), 748–56. doi:10.1016/j.brat.2008.03.003

Riccio, D. C., Ackil, J., & Burch-Vernon, A. (1992). Forgetting of stimulus attributes: Methodological implications for assessing associative phenomena. *Psychological Bulletin, 112*, 433-445. doi: 10.1037/0033-2909.112.3.433

Ridout, N., Noreen, A., & Johal, J. (2009). Memory for emotional faces in naturally occurring dysphoria and induced sadness. *Behaviour Research and Therapy, 47,* 851–860. doi:10.1016/j.brat.2009.06.013

Rimes, K. A., &Watkins, E. (2005). The effects of self-focused rumination on global negative self-judgments in depression. *Behaviour Research and Therapy, 43,* 1673–1681. doi:10.1016/j.brat.2004.12.002

Segerstrom, S. C., Tsao, J. C. I., Alden,L.E., & Craske,M.G. (2000).Worry and rumination: Repetitive thought as a concomitant and predictor of negative mood. *Cognitive Therapy and Research, 24*, 671–688. doi: 10.1023/A:1005587311498

Spruyt, A., Clarysse, J., Vansteenwegen, D., Baeyens, F., & Hermans, D. (2010). Affect 4.0: a free software package for implementing psychological and psychophysiological experiments. *Experimental Psychology, 57*, 36-45. doi: 10.1027/1618-3169/a000005

Suengas, A. G., & Johnson, M. K. (1988). Qualitative effects of rehearsal on memories for perceived and imagined complex events. *Journal of Experimental Psychology: General, 117*, 377-389. doi: 10.1037/0096-3445.117.4.377

Trope, Y., & Liberman, N. (2003). Temporal construal. *Psychological Review, 110*, 403–421. doi: 10.1037/0033-295X.110.3.403

Van Lier, J., Vervliet, B., Vanbrabant, K., Lenaert, B., Raes, F. (in press). Abstract thinking about negative events in dysphoric students leads to negative generalization. *Journal of Experimental Psychopathology.*

Vassilopoulos, S. P., & Watkins, E. R. (2009). Adaptive and maladaptive self-focus: a pilot extension study with individuals high and low in fear of negative evaluation. *Behavior therapy*, *40*(2), 181–9. doi:10.1016/j.beth.2008.05.003

Vervliet, B., Kindt, M., Vansteenwegen, D., & Hermans, D. (2010). Fear generalization in humans: Impact of prior non-fearful experiences. *Behaviour Research and Therapy, 48*, 1078-1084. doi:10.1016/j.brat.2010.07.002

Watkins, E. (2004). Adaptive and maladaptive ruminative self-focus during emotional processing. *Behaviour Research and Therapy*, *42*(9), 1037–52. doi:10.1016/j.brat.2004.01.009

Watkins, E. (2008). Constructive and unconstructive repetitive thought. *Psychological Bulletin*, *134*(2), 163-206. doi:10.1037/0033-2909.134.2.163

Watkins, E. R., Baeyens, C. B., & Read, R. (2009). Concreteness training reduces dysphoria: proof-of-principle for repeated cognitive bias modification in depression. *Journal of Abnormal Psychology*, *118*, 55–64. doi:10.1037/a0013642

Watkins, E., & Moulds, M. (2005). Distinct modes of ruminative self-focus: impact of abstract versus concrete rumination on problem solving in depression. *Emotion, 5*, 319–28. doi:10.1037/1528-3542.5.3.319

Watkins, E. R., Taylor, R. S., Byng, R., Baeyens, C., Read, R., Pearson, K., & Watson, L. (2012). Guided self-help concreteness training as an intervention for major depression in primary care : a Phase II randomized controlled trial. *Psychological Medicine*, 1359–1371. doi:10.1017/S0033291711002480

Watkins, E., & Teasdale, J. D. (2004). Adaptive and maladaptive self-focus in depression. *Journal of Affective Disorders, 82*, 1–8. doi:10.1016/j.jad.2003.10.006

Wong, Q. J. J., & Moulds, M. L. (2009). Impact of rumination versus distraction on anxiety and maladaptive self-beliefs in socially anxious individuals. *Behaviour research and therapy*, *47*(10), 861–7. doi:10.1016/j.brat.2009.06.014

Wong, Q. J. J., & Moulds, M. L. (2012). Processing mode during repetitive thinking in socially anxious individuals: evidence for a maladaptive experiential mode. *Journal of behavior therapy and experimental psychiatry*, *43*(4), 1064–73. doi:10.1016/j.jbtep.2012.05.002

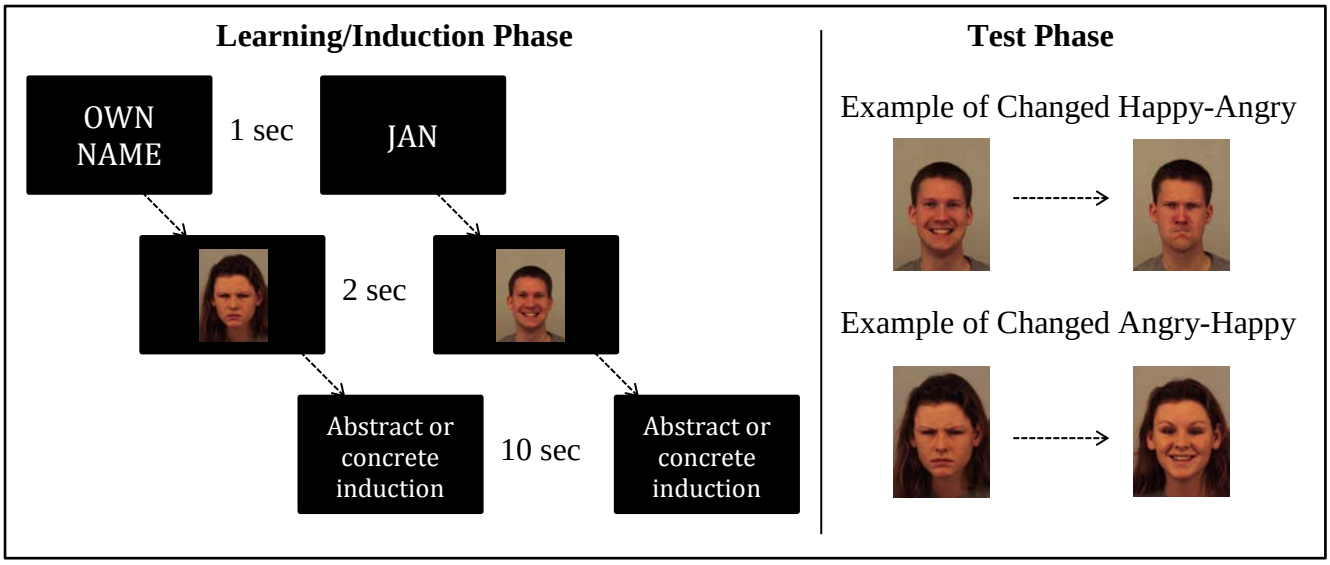

Figure 1. Sequence in the learning/induction phase and examples of the changed expressions in the test phase

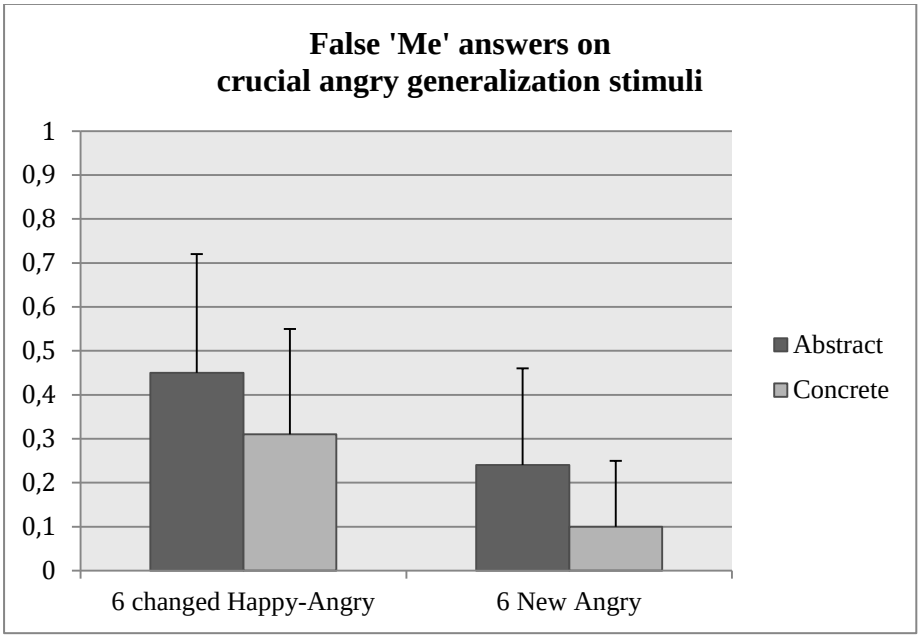

Figure 2. Proportion of false 'Me' answers for the crucial generalization stimuli per condition (error bars denote 1 SD)

Table 1

Correlations, means and standard deviations of study measures

	1	2	3	4	5	6	7	8	9
1. DASS (depression)[1]	–								
2. BFNE	.17	–							
3. PTQ	.38***	.56***	–						
4. Pre-Mood	.34**	.16	.28**	–					
5. Post-Mood	.31**	.25*	.40***	.54***	–				
6. Pre-Self-Focus	-.07	.07	.05	-.01	.02	–			
7. Post-Self-Focus	-.19†	.06	.02	-.09	.21*	.71***	–		
8. Abstract VAS	.17	.15	.17	.25*	.32**	.05	.12	–	
9. Concrete VAS	.11	-.06	-.19†	-.01	.01	.06	.00	-.03	–
Abstract *M* (*SD*)	5.27 (5.33)	20.21 (11.44)	27.98 (8.68)	23.49 (23.22)	25.37 (19.73)	40.59 (16.27)	43.39 (19.84)	34.06 (25.89)	56.45 (27.16)
Concrete *M* (*SD*)	9.64 (7.44)	22.15 (12.15)	30.36 (8.45)	20.38 (18.91)	30.28 (21.21)	44.48 (21.62)	46.02 (21.59)	23.22 (21.48)	69.84 (20.19)

Notes: †$p < .07$; *$p < .05$; **$p < .01$; ***$p < .001$. All p-values were two-tailed. 1. In line with the manual for the DASS, we multiplied the total value of the DASS21 Depression scale by 2 (Lovibond & Lovibond, 1995).

Table 2

Proportion means and standard deviations in the recognition task

Type of faces	Answer	Abstract	Concrete
12 original angry[a]	*Me*	.74 (.21)	.66 (.20)
	Jan	.11 (.17)	.13 (.16)
	New	.15 (.12)	.21 (.16)
8 changed angry-happy[c]	*Me*	.19 (.22)	.20 (.22)
	Jan	.37 (.25)	.30 (.22)
	New	.44 (.20)	.51 (.19)
4 original happy[a]	Me	.14 (.20)	.17 (.25)
	Jan	.60 (.26)	.60 (.30)
	New	.26 (.20)	.24 (.24)
6 changed happy-angry[b]	**Me**	.45 (.27)	.31 (.24)
	Jan	.18 (.22)	.18 (.19)
	New	.38 (.20)	.50 (.22)
4 new happy[c]	Me	.07 (.19)	.04 (.10)
	Jan	.19 (.27)	.11 (.14)
	New	.74 (.29)	.86 (.18)
6 new angry[b]	**Me**	.24 (.22)	.10 (.15)
	Jan	.10 (.13)	.10 (.15)
	New	.66 (.23)	.80 (.20)

Notes: italics = correct answer; bold = generalization answer; [a] original stimuli; [b] crucial generalization stimuli for angriness applied to their own name; [c] generalization stimuli for happiness applied to the other person 'Jan'